

**STUDIES OF NEOTROPICAL CADDISFLIES, XLVII;
KUMANSKIELLA, A NEW GENUS OF
MICROCADDISFLIES FROM CUBA AND PUERTO RICO**

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Abstract.—A new genus of Neotrichiini, *Kumanskiella*, and new species *K. karenae*, from the Greater Antilles are described and illustrated. *Mayatrichia aliena* is transferred into this new genus. Keys to the genera of Neotrichiini are provided and a proposed phylogeny of the tribe presented. *Kumanskiella* appears most closely related to *Neotrichia* with *Taxatrichia* the sister group to *Mayatrichia*, *Kumanskiella* and *Neotrichia*.

In 1987, Kumanski described *Mayatrichia aliena* from a single male collected from Sierra de Trinidad, Cuba. He placed the species in the genus *Mayatrichia* primarily on the basis of the four tibial spurs on the hindleg, but mentioned that in most characters of the male genitalia the species was similar to *Neotrichia*. Kumanski concluded that the species might be better placed in a new generic taxon, but with only a single specimen he left the taxonomic position unresolved.

In 1989, a series of microcaddisflies similar to *M. aliena* were collected from a malaise trap over a small stream in Puerto Rico by E. C. Masteller. A comparison of this material with the type of *M. aliena* revealed the specimens to represent a new, but closely related species. Larvae of this species were collected by Karen Buzby and were found, as with the adults, to possess characteristics intermediate between the genera *Mayatrichia* and *Neotrichia*. With both species fitting poorly within the generic limits of either *Mayatrichia* or *Neotrichia*, we herein erect the new genus *Kumanskiella*.

Morphological terminology used in the species descriptions follows that of Marshall, 1979. Length is measured from the top of the head to the tip of the forewings and is given as a range with more than one specimen. Type material will be deposited in the National Museum of Natural History (Smithsonian Institution), Center for Energy and Environmental Research (Puerto Rico), and the University of Alabama. The type of *Mayatrichia aliena* is deposited in the National Natural History Museum, Sofia, Bulgaria.

***Kumanskiella*, new genus**

Type species: *Kumanskiella karenae*, new species

Adult.—Head light brown in color, yellow between posterior warts; 3 ocelli; tentorium with anterior arms complete; antennae light brown, 18-segmented, about 1/3 length of forewing. Thorax light brown; pronotum narrow with pair of mesal and

lateral warts; mesoscutellum without transverse suture; metascutellum pentagonal. Forewings narrow, brown with no discernible pattern in alcohol, small lobe on posterobasal margin; hindwings brown, attenuate, patch of long setae on anterobasal margin. Legs yellow, tibial spur formula 0, 2, 4, outer spurs barely $\frac{1}{2}$ length of inner spurs. Body circular in cross-section. Abdomen yellow; segment VI with short apicomesal projection.

Male genitalia.—Abdominal segment IX elongate posteroventrally in lateral aspect, bearing spine or sclerotized projection. Bracteoles present as lightly sclerotized lobes or acute projections from lateral margins of segment IX. Segment X membranous and indistinct dorsally. Inferior appendages well developed and elongate. Subgenital plate prominent, narrowing to distal beak in lateral aspect, in ventral view rounded basolaterally with mesal protuberance distally. Phallus with long tubular basal portion, sinuate asymmetrical median area bearing spiral process, apical portion bulbous beyond spiral process then tapering to narrow apex.

Female genitalia.—Segment VIII with pair of elongate apodemes; thin tongue-like process arising anteroventrally, tapering and projecting posteriorly. Segment IX with pair of short apodemes. Segment X short, rounded apically bearing pair of papillae subapically. Bursa copulatrix simple, narrow and elongate anteriorly and posteriorly, median portion oblong with thin cuneiform mesal sclerite.

Larva.—Head unicolorous brown, narrowing anteriorly in dorsal view, coronal and frontoclypeal sutures distinct, elongate seta posterior to eye, labrum well developed and covering mandibles. Thoracic nota unicolorous brown with medial ecdysial line; short, stout setae along anterior and anterolateral margins, few scattered short setae on dorsal surface; pleural sclerites well developed on meso- and metathorax, reduced on prothorax; prothoracic legs short with widened coxa and femur, meso- and metathoracic legs slender and elongate. Abdomen nearly cylindrical with distinct intersegmental grooves, lateral fringe of short setae, elongate seta dorsally and ventrally; abdominal segments IX and X with dorsal sclerites each bearing numerous elongate setae; anal prolegs elongate, projecting from body, anal claw short and stout. Larval case constructed of sand grains, slightly compressed dorsoventrally, gently tapering posteriorly, anterior and posterior openings semicircular.

Etymology.—Named in recognition of Krassimir P. Kumanski, who first collected the genus in Cuba.

***Kumanskiella karenae*, new species**

Figs. 1–4

Male.—Length 1.5–1.9 mm. Brown in alcohol, no discernible pattern on wings. Antennae 18-segmented. Sternum of abdominal segment VI with short apicomesal process. Segment VIII square. Segment IX in lateral view narrowing posteriorly to a mesal, setose lobe, which bears a large distally-projecting spine; short rounded bracteoles arising mesally from inner surface; in ventral view deeply incised anteriorly, posteriorly broadly incised, each lateral arm bearing large spine; in dorsal aspect, broadly incised posteriorly and anteriorly, pair of oblong bracteoles originating near lateral margins and projecting distally. Segment X narrow in lateral view, membranous near apex; in dorsal aspect short and broadly rounded distally. Inferior appendages thin in lateral view, narrowing to rounded apex; in ventral view narrowly

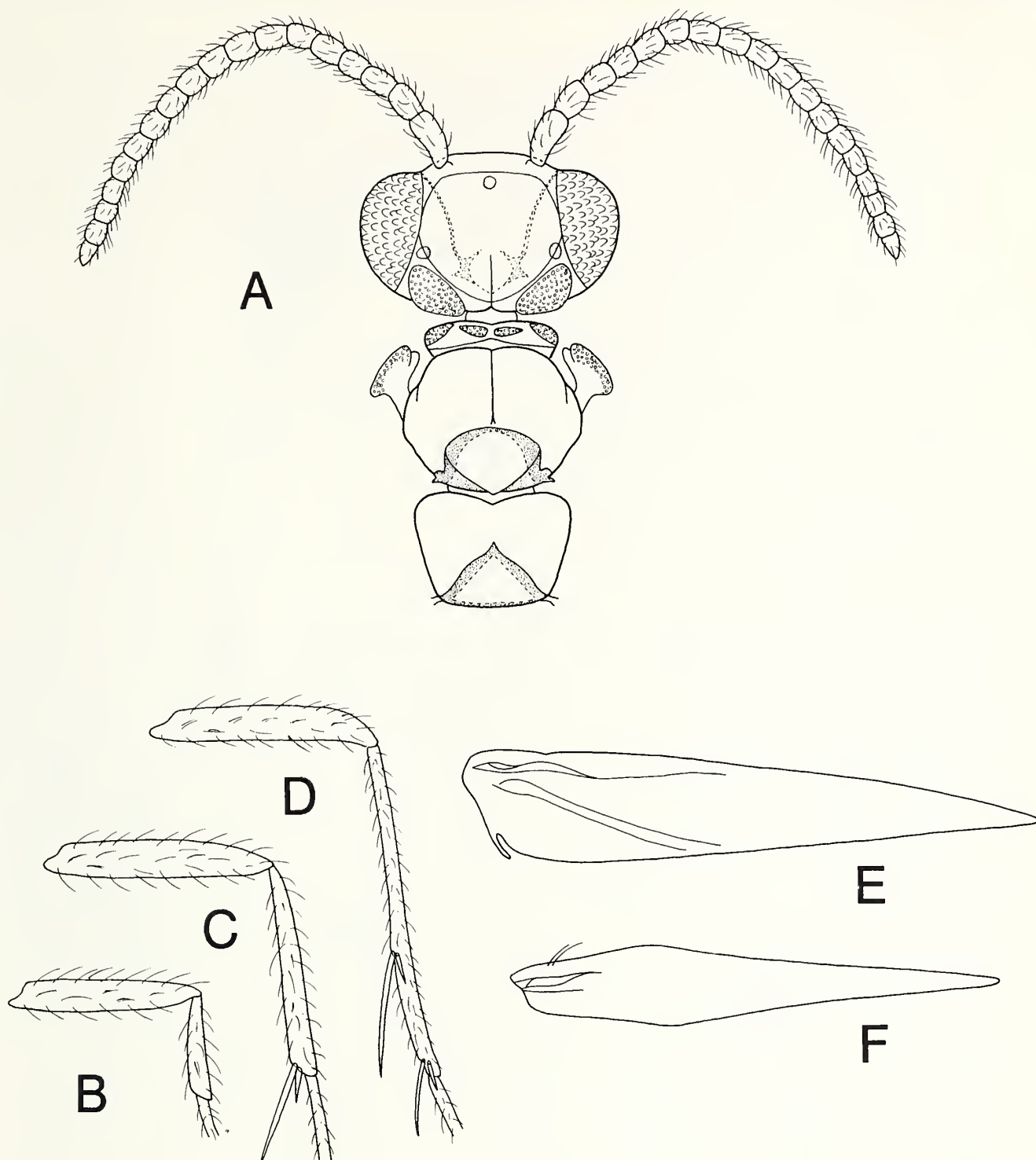


Fig. 1. *Kumanskiella karenae*, new species. Adult, male: A. Head and thorax, dorsal view. B. Prothoracic leg. C. Mesothoracic leg. D. Metathoracic leg. E. Forewing. F. Hindwing.

separated basally and tapering distally from broad base, slightly diverging at mid-length. Subgenital plate narrow, generally rectangular in lateral view; in ventral and dorsal aspects wide basally, with setae bearing knobs on inner margin, rounded laterally, narrowing to rounded apex, bearing pair of setae. Phallus with long, tubular basal portion, sinuate asymmetrical median area bearing spiral process, apical portion bulbous beyond spiral process then tapering to narrow apex.

Female.—Length 1.5–2.0 mm. Brown in alcohol. Antennae 18-segmented. Abdominal segment VI with short apicomeresal process on venter. Segment VII truncate. Segment VIII elongate and narrow, fringe of setae on posterior margin, elongate

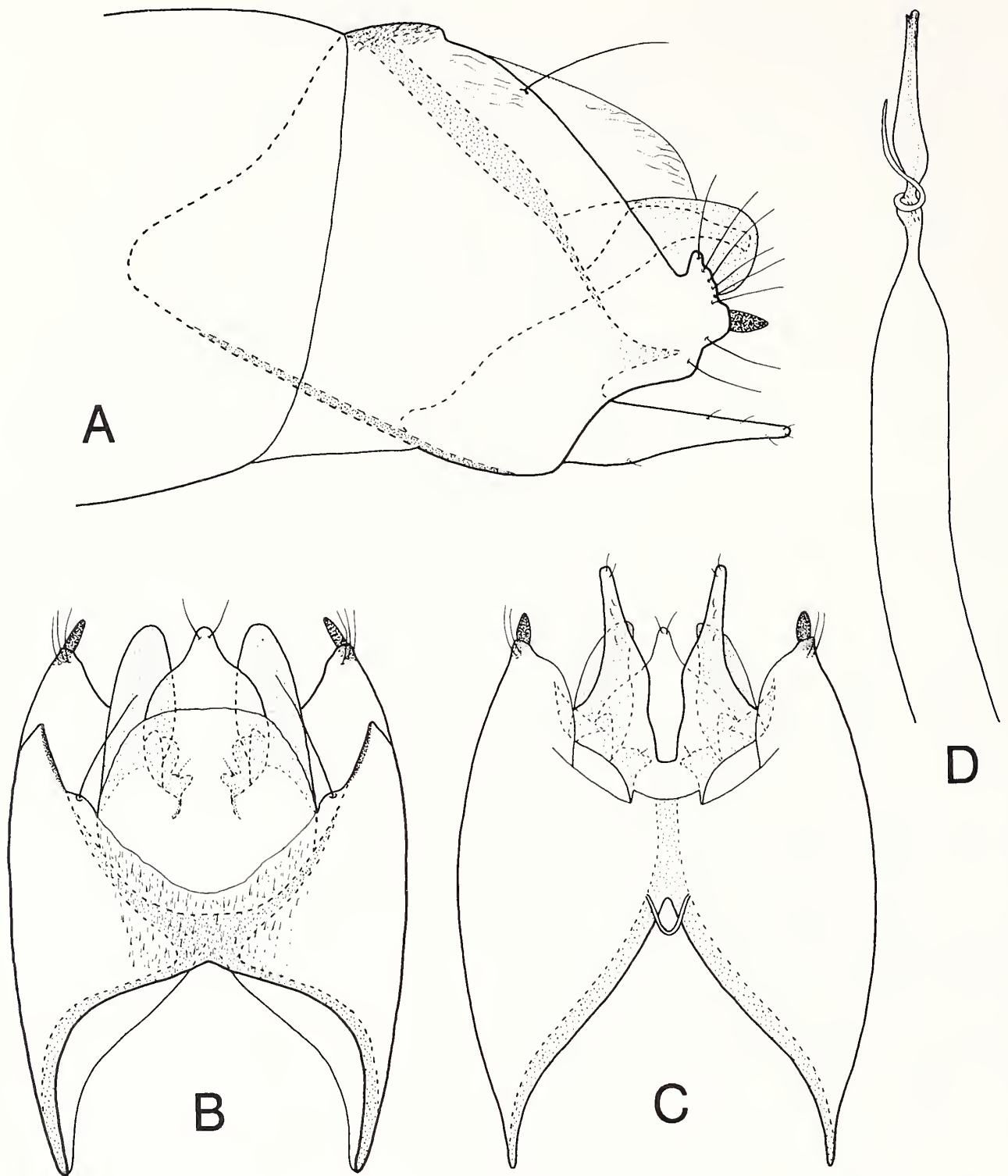


Fig. 2. *Kumanskiella karenae*, new species. Male genitalia: A. Lateral view. B. Dorsal view. C. Ventral view. D. Phallus, dorsal view.

tongue-like process arising anteroventrally, narrowing distally, pair of thin apodemes extending from lateral margins at juncture with segment VII and extending just into segment VI. Segment IX short, pair of median apodemes originating anterolaterally and extending anteriorly through segment VI. Segment X narrow and tapering to rounded apex, bearing pair of papillae subapically. Bursa copulatrix simple, narrow and elongate anteriorly and posteriorly, anterior extension about half length of posterior, median portion oblong with a thin mesal sclerite which is deeply incised anteriorly, smaller anterior sclerite with posterior notch.

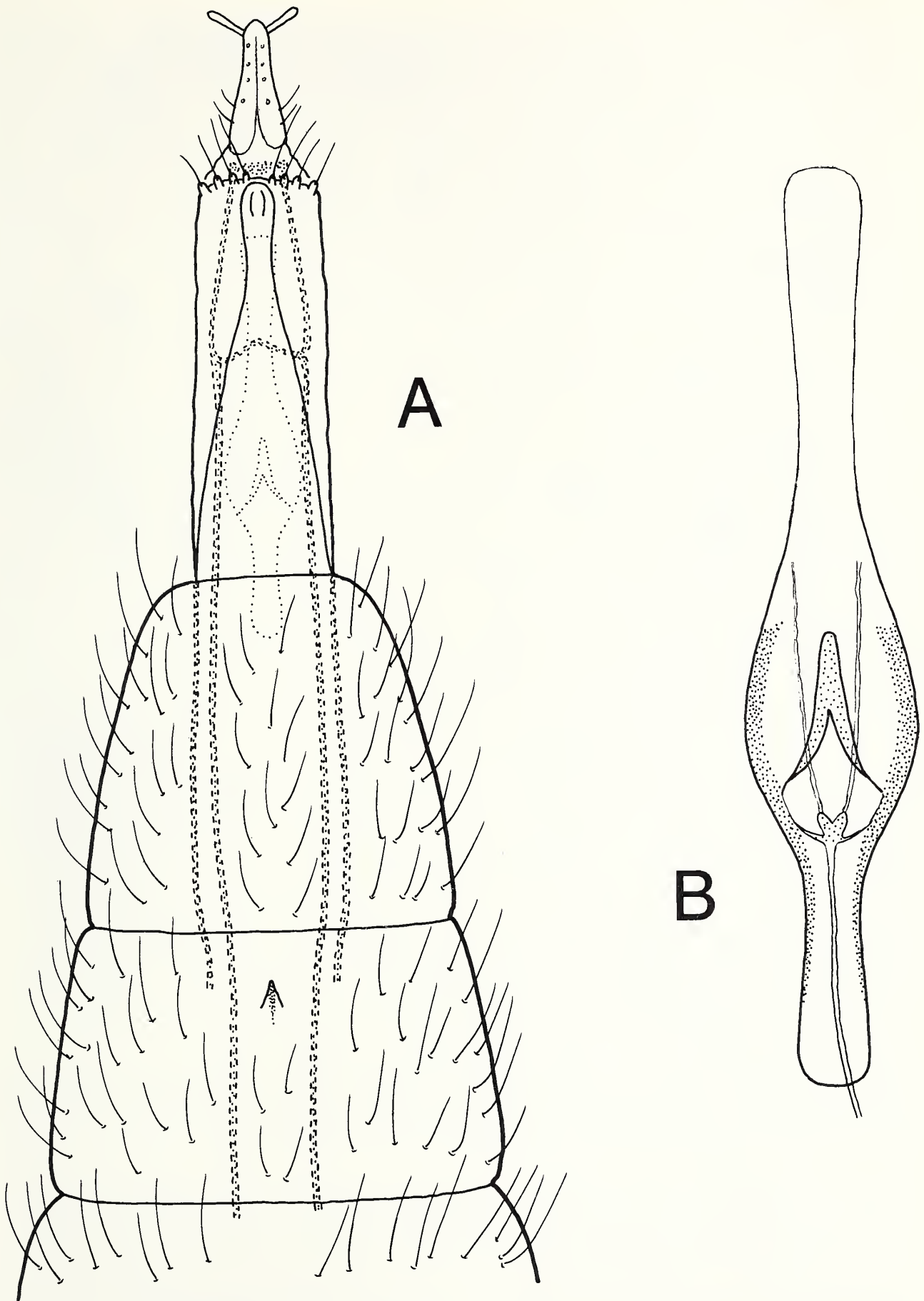


Fig. 3. *Kumanskiella karenae*, new species. Female genitalia: A. Terminal abdominal segments, ventral view. B. Bursa copulatrix, ventral view.

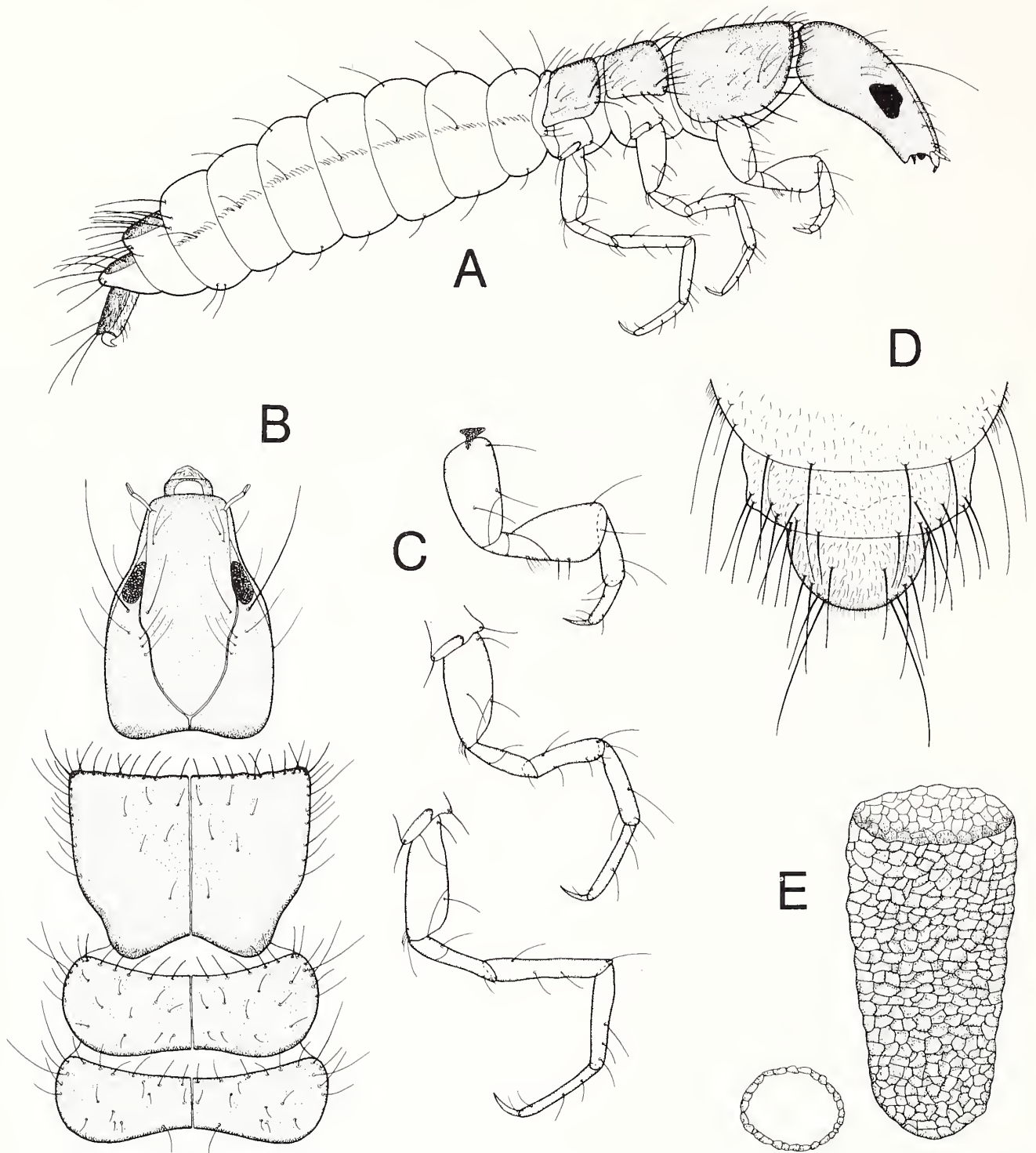


Fig. 4. *Kumanskiella karenae*, new species. Larva: A. Lateral view. B. Head and thorax, dorsal view. C. Pro-, meso-, and metathoracic legs, lateral view. D. Abdominal segments IX and X, dorsal view. E. Case, dorsal view, insert of posterior opening.

Larva. — Length 0.8–1.2 mm (10 larvae measured). Head unicolorous brown, slightly darker at posterior margin, narrowing anteriorly in dorsal view, coronal and frontoclypeal sutures distinct, the latter less so in anterior portion, numerous setae along frontoclypeal suture, elongate seta posterior to eye; antennae short, 2-segmented with second segment about $\frac{1}{3}$ length of first; labrum well developed and elongate, covering mandibles. Thoracic nota heavily sclerotized, unicolorous brown, slightly darker at posterior margins, each notum with median ecdysial line; pronotum enlarged, about as wide as long, narrowing posterolaterally, setae along anterior and anterolateral

margins, seta short and stout, few scattered short setae near ecdysial line; meso- and metanota similar in shape, wider than long, short setae along anterior and anterolateral margins and scattered over the dorsal surface; pleural sclerites well developed on meso- and metathorax, reduced to a small triangle on prothorax; prothoracic legs short with widened coxa and femur; meso- and metathoracic legs slender and elongate. Abdomen nearly cylindrical, with intersegmental grooves well defined, lateral fringe of short setae, elongate seta dorsally and ventrally, segments IX and X with dorsal sclerites each bearing numerous elongate setae; anal prolegs elongate, projecting from body, lateral sclerite of proleg elongate, bearing several setae posteriorly, anal claw short and stout. Larval case constructed of sand grains, slightly compressed dorsoventrally, and gently tapering posteriorly, anterior and posterior openings semi-circular. Length of case 0.9–1.6 mm (10 cases measured).

Etymology.—Named in recognition of Karen Buzby who has faithfully removed insects from the malaise trap and who collected and first recognized the larvae in her field samples.

Type material.—Holotype ♂. Puerto Rico, El Verde Field Station, Quebrada Prieta, malaise trap, 370 m, 6–10 February 1990, O.S. Flint, Jr.

Paratypes. Puerto Rico, same data as holotype, 13♂, 32♀; same locality, but all following from emergence trap; 22–27 February 1989, E.C. Masteller, 1♂, 3♀; March–May 1989, K. Buzby and E.C. Masteller, 1♂, 1♀; 20 February 1990, 1♀; 19 June 1990, 1♀; 25 June 1990, 1♂; 4 July 1990, 1♀; 7 July 1990, 1♀; 25 July 1990, 2♀; 8 August 1990, 1♂; 13 October 1990, 1♀; 10 December 1990, 2♂; 11 February 1991, 1♀; 13 February 1991, 1♂; 20 February 1991, 1♂, 1♀; 22 February 1991, 2♂, 2♀; 4 March 1991, 1♀; 6 March 1991, 1♀; 11 March 1991, 1♂, 2♀; 19 March 1991, 1♂, 2♀; 23 March 1991, 1♀; 27 March 1991, 1♂; 30 March 1991, 1♂; 5 April 1991, 1♂; 8 April 1991, 2♀; 17 April 1991, 2♂; 20 May 1991, 2♂; 19 June 1991, 1♂; 9 July 1991, 1♀; 13 July 1991, 1♂; 17 July 1991, 2♂; 29 July 1991, 1♂, 1♀. Puerto Rico, El Verde Field Station, Quebrada Toronja, bottom sample, 11 August 1990, K. Buzby, 2 larvae; 31 August 1990, 4 larvae; 11 October 1990, 1 larvae; 22 October 1990, 2 larvae; 12 December 1990, 4 larvae; 16 January 1991, 2 larvae.

Habitat.—Quebrada Prieta is a second order, high gradient mountain stream, averaging 20% slope, near El Verde in the Luquillo Experimental Forest of northeastern Puerto Rico. The stream originates at approximately 600 meters above sea level (masl) and flows into the Quebrada Sonadora at 310 masl; the emergence trap was placed at 390 masl. The predominant substrates are bedrock, large boulders and cobble. The larvae were taken in the Quebrada Toronja, a very similar stream that is adjacent to the Prieta. These streams are all tributaries of the Rio Espiritu Santo. They flow through tabonuco forest, the predominant type on the Luquillo Mountains below 600 masl (preceding data supplied by K. Buzby, pers. comm.).

Kumanskiella aliena (Kumanski), **New Combination**

Fig. 5

Mayatrachia aliena Kumanski, 1987:24.

Male.—Length 1.7 mm. Brown in alcohol. Antennae broken, but with at least 18 segments. Sternum of abdominal segment VI with short apicomeresal process. Segment VIII square. Segment IX in lateral view narrowing posteriorly to form setose lobe,

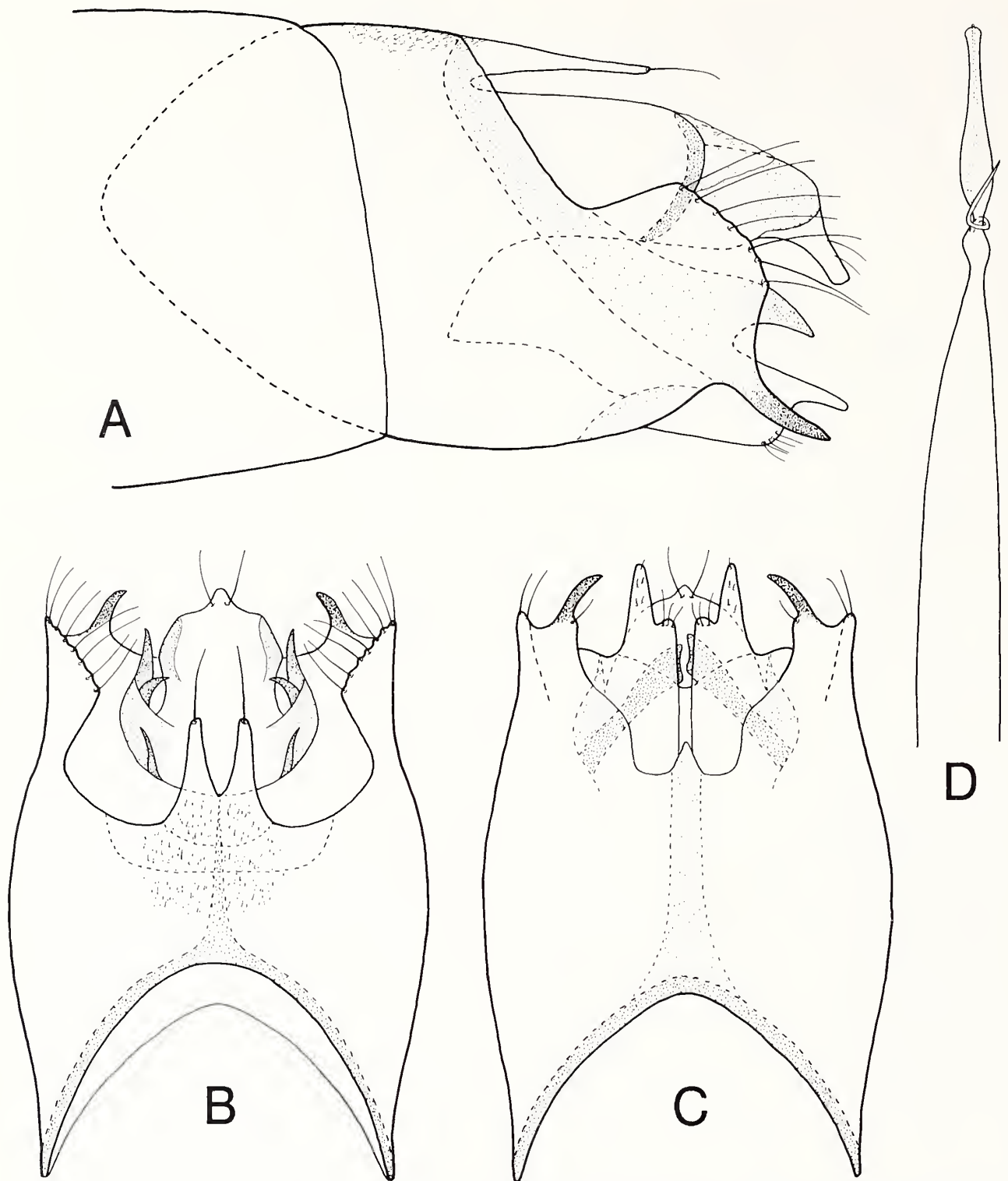


Fig. 5. *Kumanskiella aliena*, new combination. Male genitalia: A. Lateral view. B. Dorsal view. C. Ventral view. D. Phallus, dorsal view.

posteroventral margin with elongate, acute process; dorsally with pair of long, finger-like processes mesally, each bearing long seta apically; incised mesally in ventral view, each lateral arm with heavy sclerotized spine directed inward; bracteoles sclerotized and originating on inner posterolateral margins, in lateral view falciform, in ventral view elongate and narrow, slightly emarginate apically. Segment X membranous and indistinct dorsally, ventrolateral margins developed as an obliquely curved sclerite, in dorsal aspect visible as acute lateral projections, directed posteriorly. Inferior appendages in lateral view rectangular with elongate dorsal extension

distally; in ventral view narrowly separated along straight inner margins, lateral digitiform extension distally. Subgenital plate in lateral view with prominent distal beak projecting somewhat ventrad; in dorsal view narrow with sinuate lateral margins, distally with mesal protuberance bearing pair of subapical setae. Phallus with long, tubular basal portion, sinuate asymmetrical median area bearing spiral process, apical portion slightly bulbous beyond spiral process then tapering to thin, slightly flared apex.

Female. — Unknown.

Larva. — Unknown.

Type locality. — Cuba: Province Las Villas, Sierra de Trinidad, small torrent on the road Trinidad-Topes de Collantes, 150 m, 3 December 1982.

SYSTEMATIC RELATIONSHIPS

The Neotrichiini as presently defined (Marshall, 1979) are restricted in distribution to the New World with species occurring throughout North, Central, and South America, including the West Indies. The tribe is now comprised of four genera, *Taraxitrichia*, with a single species from Venezuela (Flint and Harris, 1991), *Kumanskiella*, with two species from the Greater Antilles, *Mayatrichia* with five species from North, Central and northern South America (Harris and Holzenthal, 1990) and *Neotrichia* with over 80 species and a widespread distribution over the Americas. These genera are readily distinguished as adults and larvae, as far as they are known (the immature stages of *Taraxitrichia* are as yet unknown) (Table 1).

KEY TO ADULT MALE NEOTRICHIINI

1. Mesothoracic leg with three tibial spurs; without ocelli *Taraxitrichia*
— Mesothoracic leg with two tibial spurs; with ocelli 2
- 2(1). Metathoracic leg with three tibial spurs *Neotrichia*
— Metathoracic leg with four tibial spurs 3
- 3(2). Bracteoles elongate (Harris and Holzenthal, 1990, fig. 1A); phallus tubular and lacking spiral process (Harris and Holzenthal, 1990, fig. 1D) *Mayatrichia*
— Bracteoles not clearly evident (Fig. 2A); phallus with spiral process and divided into basal and distal portions (Fig. 2D) *Kumanskiella*

TENTATIVE KEY TO LARVAE¹

1. Thoracic nota with elongate hairs along the margins and scattered on the surface (Wiggins, 1977, fig. 7.8F) *Neotrichia*
— Thoracic nota with short, stout setae along the margins and scattered on the surface (Fig. 4A, B; Wiggins, 1977, fig. 7.7F) 2
- 2(1). Larval case constructed of sand grains (Fig. 4E); abdominal segments well defined (Fig. 4A) *Kumanskiella*
— Larval case constructed of silk, walls reinforced with ridges (Wiggins, 1977, fig. 7.7B; Ross 1944, fig. 558); abdominal segments poorly defined (Wiggins, 1977, fig. 7.7A) *Mayatrichia*

¹ The key is tentative since only a few species of Neotrichiini have associated larval stages and the larva of *Taraxitrichia* is unknown. Since *Taraxitrichia* appears to be closely related to *Mayatrichia*, we would expect the larvae to be similar in overall appearance.

Table 1. Characteristics of the Neotrichiini.

	Adult					Larvae		
	Tibial spurs	Ocelli	Bracteoles	Phallus	Bursa copulatrix	Case	Thoracic setae	Abdominal segments
<i>Neotrichia</i>	0,2,3	3	Often present	Complex	Thin cuneiform vaginal sclerite	Sand	Elongate	Distinct
<i>Kumanskiella</i>	0,2,4	3	Poorly defined	Complex	Thin cuneiform vaginal sclerite	Sand	Short	Distinct
<i>Mayatrichia</i>	0,2,4	3	Present	Simple	Vaginal sclerite with anterior lobes	Silk	Short	Indistinct
<i>Taraxitrichia</i>	0,3,4	0	Present	Simple	Vaginal sclerite with anterior lobes	—	—	—

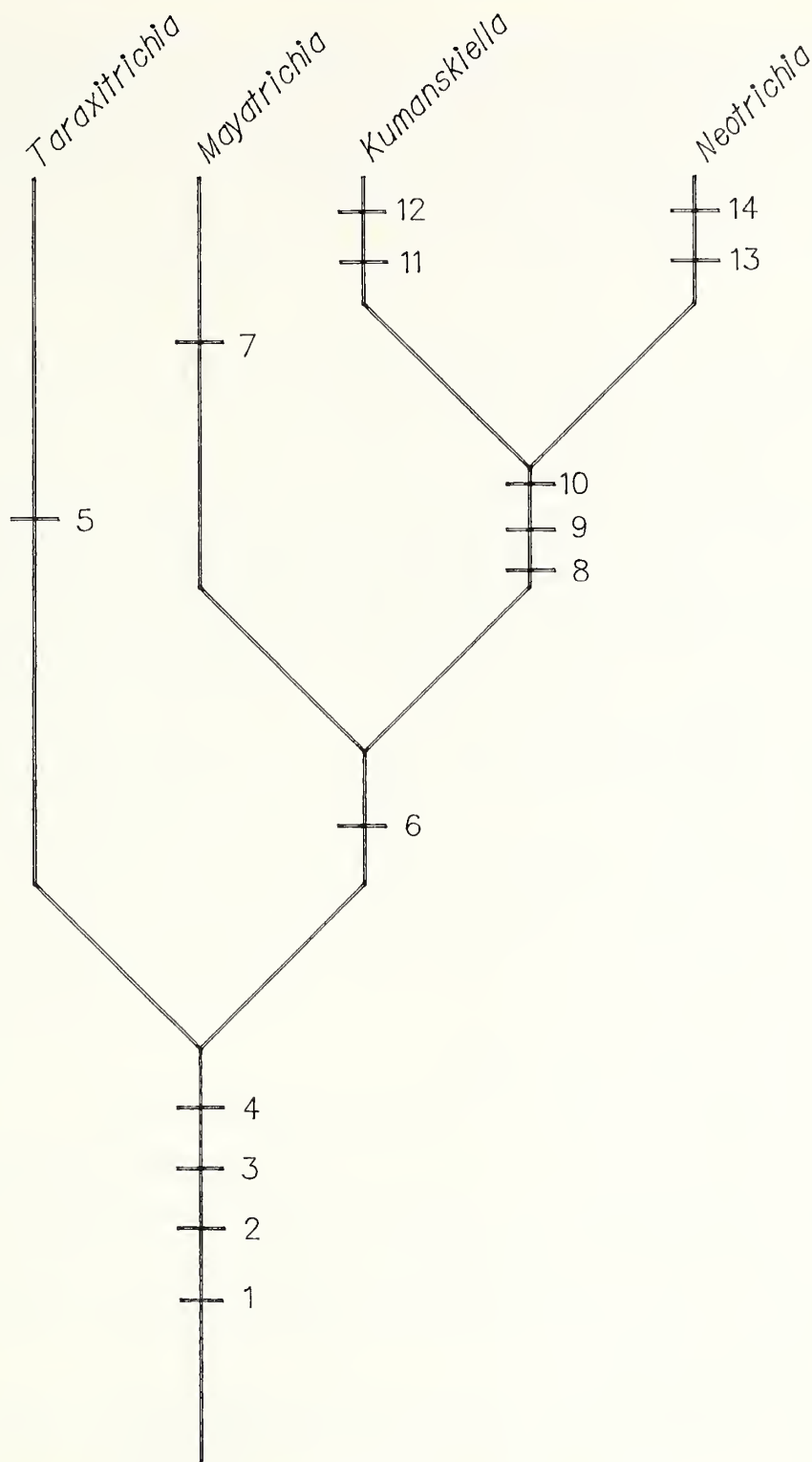


Fig. 6. Proposed phylogeny of the genera of Neotrichiini.

Although Marshall (1979) summarized much of the current knowledge of the Hydroptilidae, she only suggested phylogenetic placement of the tribes, giving neither characters nor producing a cladistic analysis. In her Chart II, Marshall places the Ochrotrichiini as the basal sister group to a clade inclusive of the Neotrichiini, Hydroptilini, Orthotrichiini, and several unplaced genera. The Ochrotrichiini are characterized by having a tibial spur formula of 1, 3, 4 or 0, 3, 4, simple phallus without spiral process, 3 ocelli, and a transverse suture on the mesoscutellum.

The Ochrotrichiini are here considered the out-group to the Neotrichiini in order

to root the proposed phylogeny of Figure 6. Monophyly of the Neotrichiini is supported by the following synapomorphies:

1. Bracteoles originating from posterior margin of abdominal segment IX;
2. Lack of a transverse suture on the mesoscutellum;
3. Larvae constructing cylindrical cases;
4. Anal prolegs of larvae, elongate, cylindrical and projecting prominently.

Taraxitrichia appears to be the sister group to the other genera in the tribe as it retains the plesiomorphic condition of the third tibial spur on the mesothoracic leg and the simple phallus which lacks a spiral process. However, the absence of ocelli (5) in this genus is autapomorphic.

Mayatrichia, *Kumanskiella* and *Neotrichia* share the apomorphic condition of the mesothoracic leg having two tibial spurs (6). *Mayatrichia* is distinguished on the basis of the larvae having poorly defined abdominal segments (7). *Mayatrichia* retains the simple phallic structure which is plesiomorphic. With *Taraxitrichia*, *Mayatrichia* shares the character of the females having a bursa copulatrix with a pair of anterior lobes (Harris and Holzenthal, 1990, fig. 2B). As well, both these genera have several species with an elongate sternal process on the abdomen of the males. If we consider these to be plesiomorphic characters possessed by the hypothetical ancestor of the tribe (HTU), then a shortening of the sternal process, a character reversal, seen in both *Kumanskiella* and *Neotrichia*, as well as a loss of the anterior lobes of the bursa copulatrix seen in these two genera is apomorphic.

Monophyly for *Kumanskiella* and *Neotrichia* is inferred by three synapomorphies:

8. Complex phallic structure, usually with distinct distal and basal sections and spiral process;
9. Larvae with cylindrical sand cases;
10. Bursa copulatrix with narrow, cuneiform vaginal sclerite.

Both genera also have in common, larvae with well defined abdominal segments which is probably plesiomorphic since larvae of Ochrotrichiini also have this character. However, another possibility is that the HTU had larvae with poorly defined abdominal segments, with a reversal of the character state in *Kumanskiella* and *Neotrichia*. The interpretation of this larval character will be clearer with the discovery of the larvae of *Taraxitrichia*.

Kumanskiella is distinguished by the modified bracteoles (11) which are difficult to discern, and the asymmetrical median portion of the phallus (12). *Neotrichia* is distinctive in that the metathoracic leg has only three tibial spurs (13) and the larvae have elongate setae on the thoracic nota (14).

ACKNOWLEDGMENTS

Dr. Krassimir Kumanski, Director, National Natural History Museum, Sofia, Bulgaria, kindly lent the type of *Mayatrichia aliena* for comparison as well as several *Neotrichia* from Cuba and was very helpful in our diagnosis of the new genus. Dr. E. C. Masteller, Behrend College, Pennsylvania State University, Erie, Pennsylvania, first installed the emergence traps on *Quebrada Prieta* and has continued to oversee this operation and has sent all the caddisflies to OSF for identification. Karen Buzby, College of Environmental Science and Forestry, State University of New York, Syracuse, New York, has emptied these traps several times a week over the last

two years, and recognized the larvae of *Kumanskiella* in the bottom samples taken for her thesis work. The research of Masteller and Buzby on the Quebrada Prieta was supported by grant BSR-8811902 from the National Science Foundation to the Center for Energy and Environment Research (University of Puerto Rico) and the Institute of Tropical Forestry (Southern Forest Experiment Station) as part of the Long-Term, Ecological Research Program in the Luquillo Experimental Forest. R. L. Mayden, University of Alabama, was very helpful in the phylogenetic analysis and construction of Figure 6.

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